# The burden of attention

# The Burden of Attention: CEO Publicity and Tax Avoidance

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**Abstract**

We use search volume index (SVI) for a CEO's name and stock ticker from Google Trends to measure CEO publicity, and examine the competing hypotheses on its relation to tax avoidance. On the one hand, CEOs who receive more attention from retail investors may engage in tax evasion activities to meet investors' performance expectations; on the other hand, they are more concerned with public image and avoiding being labeled as tax avoiders. Based on the CEOs of S&P 500 firms between 2004 and 2011, our finding supports the former and shows that CEOs with higher publicity manage to have a lower effective tax rate and cash effective tax rate. Such effect is moderated by board independence. Finally, firms with higher CEO publicity pay auditors higher tax fees, suggesting that these CEOs tend to use more tax planning services from auditors.

**Key words**: CEO publicity; CEOs; tax rate; Google Trends; search volume index; tax avoidance

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## 1. Introduction

Managers have a significant impact on their corporate tax avoidance that cannot be explained by firm-level characteristics (Dyreng et al., 2010). They study leaves on the what specific characteristics of managers affect corporate tax avoidance? Following the seminal work of Dyreng et al. (2010), Olsen and Stekelberg (2016) show that narcissistic CEOs are more likely to engage in tax avoidance because they have high self-entitlement, are exploitative, and lack moral sensibility. Law and Mills (2017) find that CEOs with military experience are less likely to engage in tax avoidance because they share the common value with government legitimacy and are more ethical. This paper studies CEO publicity as a new dimension of CEO characteristics, and examines its effects on firms' tax avoidance behavior. Publicity refers to the attention given to CEOs by retail investors.

We suggest that CEOs can influence corporate strategy, including tax policy, by setting the tone at the top and influencing the corporate culture. Corporate culture is a collective phenomenon emerging from the members' beliefs and social interaction, containing shared values, mutual understanding, and behavioral expectations that tie individuals in an organization together over time (Schein, 2004). Upper echelon leaders have primary attributes of organizational culture (Schein, 2004; Trice and Beyer, 1993). If some CEOs are inclined to aggressively avoid tax, they would recruit executives with similar values and beliefs to join the top management team (TMT). As a team, they are able to structure transactions to re-allocate taxable income from a high tax rate regime to a low tax rate regime, employ transfer pricing initiatives, set up offshore intellectual property havens, and centralize operating activities in tax-friendly jurisdictions to minimize overall corporate tax or assert the intention to permanently re-invest foreign earnings and not accrue

incremental US tax expense upon repatriation (Dharmapala and Hines, 2009; Dharmapala and Riedel, 2013; Powers et al., 2016).

We hypothesize opposing effects of CEO publicity on tax avoidance. On the one hand, CEOs with higher public attention care more about investors' expectations and therefore use aggressive tax planning strategies to increase earnings. Malmendier and Tate (2009) show that investors' expectations of future firm performance are higher for superstar CEOs. Because failing to meet investors' expectations could be detrimental to CEOs' public image and future career, CEOs with higher publicity may use tax avoidance to increase earnings to meet or beat performance expectations. CEO publicity is therefore positively associated with firms' tax avoidance behavior.

On the other hand, tax avoidance can be costly to CEOs. For example, tax avoidance can result in a higher probability of a tax audit, leading to an assessment of additional taxes, fines, interest, and penalties by tax authorities (Mills et al., 1998). A survey conducted by Graham et al. (2014) shows that almost half of respondents agree that an unfavorable consequence of aggressive tax avoidance is the potential harm to a firm's reputation. When tax avoidance activities are identified and penalized by the Internal Revenue Service (IRS), CEO publicity exaggerates the loss in terms of credibility and future career opportunities. These CEOs may suffer from a decline in social status and esteem. This suggests that CEO publicity can be negatively associated with tax avoidance behavior. The net effect of CEO publicity presents a timely and important research question.

Our sample includes CEOs of S&P 500 firms between 2004 and 2011. We use the search volume index (SVI) for each CEO's full name, plus the stock ticker of the company

provided by Google Trends as a proxy for CEO publicity.[2] Google is arguably the most convenient tool for individual investors to search for information about CEOs on the internet. Ding and Hou (2015) argue that SVI captures the active attention of retail investors. CEOs with larger SVI(s) therefore receive more publicity. Different from the indicator of superstar CEOs (Malmendier and Tate, 2009), which is observed for a very small proportion of CEOs, our publicity proxy provides a continuous measure for many CEOs. In addition, the traditional measures of CEO reputation can only explain about 11% of the variation in CEO publicity, showing that CEO publicity captures a new dimension of CEO characteristics.

We find that CEO publicity is associated with a higher level of tax avoidance activities, as indicated by the lower effective tax rate and cash effective tax rate. The effect is both statistically and economically significant. A one standard deviation increase from the mean of publicity measure leads to a 3.8% decrease in effective tax rate. The positive effect of CEO publicity on firms' tax avoidance activities is more pronounced among firms with less independent boards, implying the effective role of outside directors in moderating the aggressive tax avoidance by CEOs with high publicity. Finally, CEO publicity is positively associated with the level of tax fees paid to external auditors, showing that CEOs with high publicity use more services related to tax planning from auditing firms.

There are a number of alternative interpretations that are compatible with our results. For example, there might be confounding effects of other CEO characteristics or industry attributes. We find that the results are robust to the inclusion of CEO media coverage, age, gender, outside CEO, earnings management, year and industry fixed effects, as well as the

[2] Consistent with previous studies that count press articles as a measure of CEOs' status (Milbourn, 2003), we require a concurrent search for the stock ticker of the firm to avoid over-stated searches for common names such as John Smith.

propensity score matching (PSM) approach. To address the concern of reverse causality, we apply the dynamic panel GMM estimator and find the results consistent.

Our contribution to the literature is three-fold. First, this study complements the growing literature on the effects of CEO characteristics on firm outcomes, and tax avoidance in particular. Since Bertrand and Schoar (2003) and Dyreng et al. (2010), an increasing number of studies identify the managerial effects of CEO characteristics, including superstar status (Malmendier and Tate, 2009), reputation (Francis et al., 2008), ability (Baik et al., 2011; Demerjian et al., 2012.), facial masculinity (Kamiya et al., 2016), signature size (Ham et al., 2017), and overseas experience (Duan and Hou, 2017). Law and Mill (2017) find that CEOs with military experience pursue less tax avoidance. We use SVI to measure CEO publicity, a new dimension of CEO characteristics, and provide original evidence on its positive impact on tax avoidance.

Second, this paper adds to the literature on tax avoidance and the "under-sheltering puzzle" (Hanlon and Heitzman, 2010; Gallemore et al., 2013; Dowling, 2014) by identifying a new source of variation in firms' engagement in tax avoidance. While prior literature examines influential factors, including incentives for managers (Desai and Dharmapala, 2006), family ownership (Chen et al., 2010), labor union (Chyz et al., 2013), and board ties to low-tax firms (Brown and Drake, 2014), this study focuses on CEO publicity and finds it helpful in explaining the variation in the effective tax rate of US public firms.

The rest of the paper proceeds as follows. Section 2 proposes the competing hypotheses. Section 3 introduces the setting and research design. Sections 4 and 5 report the empirical results and robustness checks. Section 6 concludes.

## 2. Competing Hypotheses

The high publicity of CEOs may increase the market's expectations. These CEOs therefore would be under greater pressure to increase reported earnings. Brown and Caylor

(2003) show that managers' focus has shifted from avoiding losses or earnings decrease to meeting or beating analysts' expectations since the 1990s. Firms receive more positive valuation for meeting or beating analysts' expectations. When they find it difficult to meet investors' expectations, they may choose to use aggressive tax planning strategies to reduce the overall tax expense for their firm. For example, Graham et al. (2014) find that 61% of executives in their surveyed companies indicate that it is important that tax strategies do not reduce earnings per share (EPS), and 49% respond that it is important that tax strategies lead to high EPS. Furthermore**,** every dollar saved from reduced tax can be redeployed to more productive uses. For a firm that faces financial constraints in funding its profitable investment opportunities, the cash savings from tax expenses can be utilized to finance these investments, which would otherwise never be achieved (Edwards et al., 2012). Based on this discussion, we propose H1 as follows:

**H1a**: CEO publicity is positively associated with firms' tax avoidance behavior.

There are also reasons for CEOs with high publicity not to engage in tax avoidance. When a company's aggressive tax avoidance behavior is identified by the tax authority and reported by the media, reputation costs are imposed on the company and CEO. In a survey of tax executives, Graham et al. (2014) find that almost half agree that potential harm to their firm's reputation is a very important factor in deciding whether to implement an (aggressive) tax planning strategy. Moreover, the Commissioner of the Internal Revenue Service (IRS) contends that the general public has little tolerance for overly aggressive tax planning, and aggressive tax strategies lead to the loss of customer loyalty and damaged corporate image. For example, an article published in the *New York Times* on March 24th, 2011, responded to the fact that General Electricity (GE) paid virtually no tax to the US government in 2011 by noting, "critics say assertive tax avoidance of multinationals (such as GE) not only short changes the Treasury but also harms the economy by discouraging investment and

employment in the US" (Kocieniewski, 2011). Furthermore, commentators reacted by advocating, "this company (GE) should be boycotted." Aggressive tax avoidance is also likely to negatively affect the future careers of CEOs of companies undertaking such behavior. Therefore, managers have to trade off these costs against the expected benefits associated with tax avoidance. The publicity of CEOs can exaggerate the potential reputation cost if their tax avoidance activities are detected. If CEOs believe that the marginal cost of tax avoidance (i.e., adverse career perspective) exceeds the marginal benefit (i.e., increased earnings), they are induced to reduce the extent to which their firms engage in tax avoidance behavior. We hereby propose the competing hypothesis as follows:

**H1b**: CEO publicity is negatively associated with firms' tax avoidance behavior.

## 3. Setting and research design

### 3.1 Data and Sample

To study CEO publicity, we focus on CEOs of S&P 500 companies identified from the Execucomp database between 2004 and 2011. The sample period starts in 2004, when Google started to make SVI publicly accessible. We examine the sample of CEOs of S&P 500 companies because SVI (search volume index) is often not available for CEOs at small firms, whose search volume is too low to be recorded by Google Trends.

Execucomp provides information on the top five executives and information on CEOs (i.e. "Date Became CEO" and "Date Left as CEO"). We identify the CEOs from S&P 500 firms, and follow Milbourn (2003) to address the case of midyear CEO turnover. We only treat executives as CEOs in the year of CEO turnover if they were in office at least six months, and we obtain 3,862 observations. For CEOs who left the position before the year end, we only identify these as CEOs for the year if they held the position for at least six months. Likewise, for newly appointed CEOs, we identify these as CEOs only when they held the position for at least six months of the year. We also drop the following cases: 1)

executives whose title is "co-CEO"; 2) both the departing and incoming CEO worked for six months in the same calendar year; 3) executives whose "date Joined Company" is after "date Became CEO."

Next, we collect weekly SVI (search volume index) data for CEOs from Google Trends (www.google.com/trends). The SVI data represent the relative searching volume to the highest point of searching volume in the searching geography and time period. The highest point is 100, which represents the highest searching volume in the geography and time period, and other points represent the searching volume relative to the highest point. SVI has been widely used to proxy attention actively paid by retail investors (Da et al., 2011; Ding and Hou, 2015). We use SVI that originates from the US because the majority of S&P 500 companies are US firms. We use the 'full name' of the CEO provided by Execucomp and the 'ticker' of the company to search for and obtain the weekly SVI for the specified CEO. We note that the SVI data are on a monthly basis for terms that are rarely searched for. We drop these observations to make the data comparable. This leaves us with 3,430 observations.

For example, in 2008 the CEO of Apple Computer Inc. was Steve P. Jobs, and the ticker for Apple was "AAPL", so we use 'Steve P. Jobs+AAPL' to search for the SVI for Steven Jobs in 2008. We later convert the weekly SVI data into annual data to match the frequency of tax avoidance. In addition, we manually collect the number of the online news for the CEO from Google News in each calendar year by searching "CEO's full name+stock ticker." Our sample consists of 2,841 observations for S&P 500 companies between 2004 and 2011. Finally, we collect accounting data from Compustat and stock market data from CRSP.

### 3.2 Research design

We use the following model to test the hypotheses:

$$TaxAvoidance_t = \alpha_0 + \alpha_1 CEOSVI_t + \sum_{i=1}^{n} \alpha_{i+1} Control_{i,t} + Year + Industry + \varepsilon$$

Following prior literature (Dyreng et al., 2010; Armstrong et al., 2012), we use effective tax rate (ETR) and cash effective tax rate (cash ETR) as proxies for firms' tax avoidance. Unlike effective tax rate, cash effective tax rate is not biased by changes in tax accounting accruals. Additionally, cash effective tax rate reflects any tax avoidance activities that reduce cash taxes paid in the current period, including those that defer cash tax paid by creating temporary book-tax difference (Dyreng et al., 2008). Following the literature, effective tax rate is defined as total tax expense scaled by pre-tax accounting income, while cash effective tax rate (cash ETR) is defined as cash tax expense scaled by pre-tax income (Dyreng et al., 2010). Lower ETR (cash ETR) implies more tax avoidance.

The variable of interest is *CEOSVI*, which is measured by *SVIMean* and *SVIMedian*. *SVIMean* is the average weekly SVI for a CEO in calendar year *t* scaled by 100. *SVIMedian* is the median of all the weekly SVI for a CEO in calendar year *t* scaled by 100. We also control for *CEONews* in the regression, a measure of the passive attention from the public, defined as the number of online news for a CEO in calendar year *t* from Google News. Chen et al. (2015) show that media coverage plays an important role in tax avoidance behavior by serving as an information intermediary that provides new information and disseminates existing information. Media exposure of a CEO may influence corporate tax avoidance. To consider the confounding effects of media coverage, we control for *CEONews*. We apply year- and industry-fixed effects in the analysis.

Industry traits may have an unobservable confounding effect on the relationship between CEO publicity and corporate tax avoidance. For example, CEOs in high-tech internet companies, such as Mark Zuckerberg of Facebook or Larry Page of Google, are more likely to draw more public attention. Meanwhile, tax avoidance behaviors might be more common in certain industries. We therefore control the industry- and year-fixed effects in our regression to control the confounding effect of unobservable industry or time factors.

We control for variables that are identified in the literature as affecting firms' tax avoidance activities. All control variables are defined in the appendix. We incorporate firm characteristics, such as firm size (*SIZE*), the percentage of income that is generated from foreign operations (*FI*), leverage (*LEV*), and research and development activities (*R&D*). Large firms enjoy economies of scale in tax planning. Firms with substantial foreign operations have the advantage of shifting income between low and high tax rate jurisdictions (Rego, 2003). Firms with great leverage have less incentive to engage in tax avoidance due to the tax shield of debt. We also control for firm performance characteristics, such as firm profitability (*ROA*), net operating loss carry forwards (*NOL* and *DNOL*), income related to the equity method of accounting (*EQINC*), and a firm's growth opportunities (*MTB*). Firms with negative pre-tax income or significant net operating carry forward are likely to have less incentive to avoid taxes. *EQINC* controls for differences in financial and tax accounting treatment that influence effective tax rate and cash effective tax rate (Frank et al., 2009). Rapidly growing firms are found to invest more in tax planning activities (Chen et al., 2010). We include intangible assets over lagged assets (*INTAN*) and property, plant and equipment scaled by lagged assets (*PPE*) as well as CEO age, CEO gender, and CEO succession in our regression analyses. CEO succession indicates whether the CEO is appointed externally.

<< Insert Appendix I about here >>

# 4. Results

## 4.1 Descriptive statistics

Table 1 presents the descriptive statistics. The mean (median) of ETR is 0.308 (0.32), while the mean (median) of cash ETR is 0.254 (0.25). This is consistent with prior tax research reporting cash ETR is lower than ETR (Dyreng et al., 2008). The mean (median) of SVI varies from 0.24 (0.23) in the 25$^{th}$ percentile to 0.59 (0.59) in the 75$^{th}$ percentile, suggesting substantial variation in the Google search volume for CEOs. As our sample

consists of S&P 500 firms, the sample firms are large (mean logarithm of market value of 9.44) and profitable (mean ROA of 13%). The mean firm spends 2.47% of its assets from the previous year on R&D, and 23.7% of its assets from the previous year are intangible assets. The mean firm has long-term debt that equals 19.95% of its assets in the previous year. On average, foreign income constitutes 4.19% of assets in the previous year. Finally, about 40% of sample firms have net operating loss carry-forwards at the beginning of the year.

<< Insert Table 1 about here >>

**4.2 The determinants of CEO publicity**

We first explore the factors that contribute to the SVI of CEOs. Previous studies suggest that CEO personal attributes such as tenure, age, gender, and whether the CEO comes from outside the firm have an important impact on CEO status, so we include them as explanatory variables. We also include the number of online news articles provided by Google News that relate to the specific CEO. Media coverage does not necessarily guarantee attention unless investors attend to it, and the same news coverage could generate different levels of investor attention (Da et al., 2011; Ding and Hou, 2015).

Table 2 reports the results. Column 1 (2) reports the results with the mean of SVI (median of SVI) as the dependent variable. The significantly positive coefficients of CEO news, CEO age, and CEO gender suggest that CEOs with more online news coverage, old CEOs, and male CEOs receive more active attention from the public. The negative coefficient of CEO tenure implies that newly appointed CEOs attract more attention. The adjusted $R^2$ of both regressions are below 11%, indicating that a significant proportion of the variation in CEO publicity cannot be explained by other CEO characteristics.

<< Insert Table 2 about here >>

### 4.3 CEO publicity and tax avoidance

Table 3 presents the test of hypotheses. Panel A shows the results based on the mean of SVIs. Models I and II (III and IV) use ETR (cash ETR) as the dependent variable. In Model I (III), we include SVI as the only measure of CEO publicity; in Model II (IV), we add CEO online news coverage as a second measure of CEO publicity. The negative and significant coefficient of SVI mean in Model I (-0.0363, t = −4.82) suggests that CEOs with higher public attention are associated with higher levels of tax avoidance activities, resulting in a lower effective tax rate. The coefficient of the SVI mean remains negative and significant after the inclusion of CEOs' online news coverage in Model II (−0.0347, t = −4.64). CEO publicity has an incremental effect on firms' tax avoidance activities. A one unit increase in SVI mean gives rise to a 3.6% decrease in effective tax rate. Given the median tax expense of $287 million among our sample firm, this translates into tax savings of $10.4 million. As the median firm has a market value of $11.78 billion, such tax savings are equal to 0.088% of the market value of the median sample firm.

Among the control variables, the coefficients of *leverage*, *ROA*, and *INTAN* are significantly positive, suggesting that firms with higher leverage, higher profitability, and more intangible assets have a higher effective tax rate. The coefficients of foreign income (FI) and R&D are significantly negative, consistent with the prediction that firms with a higher percentage of foreign income and R&D expenses have more flexibility to reduce their overall tax burden. For example, they can use structured transaction to shift income to subsidiaries operating in low tax jurisdictions, develop tax efficient supply chains, and exploit intra-firm debt structure. Finally, the coefficient of size is negative and significant, consistent with the notion that large firms are able to contribute more resources to strategic tax planning to lower the effective tax rate. The adjusted $R^2$ ranges from 16.43% to 28.71%, indicating that a considerable portion of variation in ETR and cash ETR has been explained.

Panel B shows regression results based on the median SVI of CEOs. The results of the negative coefficients of CEO publicity are consistent. Overall, we find supporting evidence for H1, that CEOs with higher publicity engage in tax avoidance activities to a more significant extent.

<< Insert Table 3 about here >>

**4.4 The moderation effects of board independence**

Hambrick and Finkelstein (1987) argue that managerial discretion exists when there is an absence of constraint or monitoring. When CEOs have more latitude, they have a stronger influence on organizational outcome. Armstrong et al. (2015) show that board independence is negatively related to tax avoidance for high levels of tax avoidance, which is also consistent with over-investment in tax avoidance in the absence of monitoring. We therefore study whether the effect of CEO publicity on tax avoidance activities differs between firms with different levels of internal monitoring, as reflected by board independence. We expect that more independent boards are effective in constraining the tax avoidance activities of CEOs with high publicity. We construct the dummy variable *Low_Indep*, which equals one if more than 67% (2/3) of the board members are insiders, and zero otherwise, and interact it with the mean of SVI (median of SVI). The results in Table 4 confirm our prediction. The coefficient of SVI mean remains significantly negative. The negative coefficient of the interaction term (-0.069, t = -3.42) indicates that the effect of CEO publicity on tax avoidance activities is more pronounced for firms with less independent boards. Inside directors are less effective in deterring CEOs' tax avoidance activities. The coefficients of the control variables are broadly consistent with those in Table 3. The results based on the median of SVI are consistent.

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### 4.5 Tax fee

In this section, we explore how CEOs with higher publicity reduce the effective tax rate. Since CEOs are unlikely to be tax experts, they may rely on external auditors for advice on sophisticated tax planning techniques. Donohoe and Knechel (2014) find that firms with lower effective tax rate or cash ETR pay more for audit services than firms that are less aggressive in tax avoidance. We conjecture that CEOs with higher publicity pay higher tax fees to their auditors for tax planning services. We regress the natural logarithm of tax fee against CEO publicity, CEO- and firm-specific characteristics, and an indicator of Big 4 auditor.

The results are reported in Table 5. As expected, the coefficient of the SVI mean is significantly positive (0.273, t = 2.08). The results provide insights into the action of CEOs with high publicity to avoid tax for their firms. It is noteworthy that CEOs use tax planning services with non-audit fees (i.e. consultancy fees). CEO tenure is negatively associated with tax fee (−0.028, t = −4.95). Experienced CEOs have accumulated knowledge in tax planning after serving as the top executive for a number of years. Large firms, mature firms and firms with a higher percentage of foreign income pay more tax fees to auditors. The tax planning for these firms might be more complex. The results based on the median of SVI are consistent. The adjusted $R^2$ is around 38%, showing that a significant percentage of the variation in tax fees is explained.

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## 5. Robustness checks

### 5.1 Alternative specifications of tax avoidance

We perform a series of tests to verify the robustness of our results. Following Manzon and Plesko (2002), we calculate the total book-tax difference as the difference between pre-tax income and the sum of current federal tax expense and current foreign tax expense scaled

by statutory marginal tax rate (*BTD1*). In addition, we follow Frank et al. (2009) to compute permanent book-tax difference (*BTD2*), which is the total book-tax difference less deferred tax expense scaled by statutory tax rate. Finally, we calculate the discretionary permanent book-tax difference (*BTD3*) as the residual of the regression model of the permanent book-tax difference on non-discretionary items that cause such difference and other statutory adjustments unrelated to tax planning activities (Frank et al., 2009). These items include intangible assets, income reported under the equity method and attributable to minority interest, current state tax expense, changes in net operating loss carry-forwards (*NOL*), and one-year lagged permanent book-tax difference. The discretionary permanent book-tax difference is the residual from the regression.

Table 6 reports the results. Panel A presents the results based on the SVI mean. Columns 1 and 2 report results with BTD1 as the dependent variable. The coefficients of SVI means are significantly positive in both columns, suggesting that CEOs that attract more public attention engage in a higher level of tax avoidance as reflected by greater total book-tax difference. The coefficients of control variables show that firms with higher profitability, more foreign income, and more R&D expenditure have a larger book-tax difference. In Columns 3 and 4 (5 and 6), we use BTD2 (BTD3) as the tax avoidance measure, and get broadly consistent results. Panel B provides results when the SVI median is used to capture CEO publicity. The results remain consistent with the main findings. Finally, we follow Armstrong et al. (2012) to censor ETR and cash ETR to fall between zero and one, and employ a doubly censored Tobit model to mitigate the bias resulting from OLS regression. The untabulated results are consistent.

<< Insert Table 6 about here >>

### 5.2 Endogeneity issue

There are some alternative interpretations of the results. For example, corporate publicity may have confounding effects on corporate tax avoidance because CEOs' publicity may be tangled with firms' publicity (Graffin et al., 2012). It is possible that CEOs receive more attention because of news or announcements about their firms. If so, the results might be driven by firm publicity. We therefore collect the SVI of firm tickers by searching for the firm ticker data for CEOs from Google Trends (www.google.com/trends). We then calculate the *FirmSVImean* and *FirmSVImedian* in each year and incorporate them in our baseline models. The results are reported in Table 7. The significantly negative coefficient of CEO publicity helps to rule out this alternative interpretation.

<< Insert Table 7 about here >>

There is also a concern of reverse causality. An alternative interpretation is that the CEOs of firms that engage in tax avoidance behavior may attract more attention. We argue that this interpretation is not plausible, because the yearly CEO publicity is estimated from weekly SVIs, while tax avoidance is calculated based on the information from annual reports. In other words, most SVIs are recorded before the information around tax avoidance becomes available. Nevertheless, we still properly address the reverse causality issue in three ways. First, we use the dynamic panel system GMM estimator (Roodman, 2009) to address the concern that the current year CEO SVI is likely to be affected by past effective tax rate or book-tax differences. In our baseline results, we include two lags of tax avoidance measures in the model, and the results are reported in Table 8. The results are consistent with the main finding, suggesting that results are robust after controlling the dynamic reverse causality issue. Table 8 also reports the results of two specification tests, including the Hansen test of overidentification and the autocorrelation test. The Hansen test of overidentification indicates

that our instruments are valid. The AR(2) tests also suggest no evidence of second-order autocorrelation in the residuals.

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Second, we examine a sub-sample of firms that change CEOs in the sample period. We focus on 108 cases where the incoming CEO has a higher SVI (mean and median) than the departing CEO, and compare the ETR (cash ETR) in the year before the CEO departure and ETR (cash ETR) in the year after the CEO departure. The untabulated results show that the ETR (cash ETR) in the year preceding the CEO's departure is significantly higher than the ETR (cash ETR) in the year following the CEO's departure (difference = 0.0014 for ETR, 0.0073 for cash ETR, both significant at the 5% level). The results based on CEO turnover further increase our confidence in the effects of CEO publicity on tax avoidance.

Finally, we use the propensity-score matching (PSM) method to address the issue. We construct a dummy variable *Top25%SVImean* (or *Top25%SVImedian*), equal to one if the *SVImean* (or *SVImedian*) is in the top quartile, and zero otherwise, to represent CEOs who receive high attention from investors. Then, we follow Kubick and Lockhart (2017) to match each high-publicity CEO with a counterpart using the one-to-one nearest neighbor matching strategy. The results of Table 9 show that our baseline results are robust in the PSM sample. Although the results from robustness checks offer further support to the positive effects of CEO publicity on tax avoidance, a definite causal link cannot be established without an ideal instrumental variable based on exogenous shocks.

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## 6. Conclusion

In this study, we use the search volume index (SVI) of CEOs' full name plus the tickers of their companies provided by Google Trends to measure CEO publicity, and examine its relation to corporate tax avoidance. Unlike previous measures based on press coverage or

winning awards, our measure for CEO publicity captures the information demand for specific CEOs by retail investors.

We find that CEOs with higher publicity are associated with lower effective tax rates. Such effect is more pronounced among firms with less effective monitoring, as reflected by lower board independence. Further analysis shows that CEOs with higher publicity are associated with higher tax fees. These CEOs tend to use more tax planning services from auditors to reduce the overall tax costs for their firms. Our results are robust to alternative model specifications and alternative measures of tax avoidance. The finding supports the hypothesis that CEOs with higher publicity are more likely to use tax avoidance to increase reported earnings and meet the performance expectations of the market.

Our study has implications for tax authorities and investors. For example, tax authorities may pay special attention to firms with CEOs with good publicity. The attention puts pressure on them pressure to meet the expectations of the market, and they tend to engage in tax avoidance. By scrutinizing their tax practice, tax authorities might identify irregularities and recover tax that otherwise would not be collected. Our findings are of interest to investors and corporate board members. Extreme tax avoidance conducted by a CEO with high publicity may bring about regulatory enforcement or litigation risks. When extensive tax evasion behavior (e.g., a tax shelter) is detected, high publicity may exaggerate the reputation costs. We encourage future research to explore the impact of CEO publicity on other firm policies and outcomes.

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**Appendix I: Variable Definitions**

| | | |
|---|---|---|
| *ETR1* | = | total tax expense (Compustat item #16)/pre-tax income (#170). |
| *ETR2* | = | cash tax paid (#317)/pre-tax income (#170) based on Chen et al. (2010). |
| *BTD1* | = | pre-tax income- (current federal tax expense + current foreign tax expense)/statutory marginal tax rate, based on Manzon and Plesko (2002). |
| *BTD2* | = | BTD1 – (total deferred tax expense (#50)/statutory marginal tax rate), based on Frank, Lynch and Rego (2009). |
| *BTD3* | = | Residuals from estimating equation (1) by two-digit SIC code and fiscal year, where all variables including the intercept are scaled by beginning of year total assets (#6): BTD2 = α0 + α1 INTANG + α2 UNCON + α3 MI + α4 CSTE + α5 _NOL + α6 BTD2 lag + e (1) where INTANG = goodwill and other intangibles (#33); UNCON = income reported under the equity method (#55); MI = minority interest (#49); CSTE = current state income tax expense (#173); _NOL = change in net operating loss carry forward (#52); and BTD2 lag = the one-year lagged value of BTD2., based on Frank, Lynch and Rego (2009). |
| *Low_Indep* | = | An indicator equal to 1 if the board contains less than 67% independent directors, and 0 otherwise. |
| *log(Taxfees)* | = | The natural log of the tax fees (in thousands) paid by the firm. |
| *SVIMean* | = | The mean of CEO SVI in each year. |
| *SVIMedian* | = | The median of CEO SVI in each year. |
| *FirmSVIMean* | = | The mean of firm SVI in each year. |
| *FirmSVIMedian* | = | The median of firm SVI in each year. |
| *Top25%SVIMean* | = | A dummy variable equal to 1 if the *SVImean* is in the top quartile, and 0 otherwise. |
| *Top25%SVIMedian* | = | A dummy variable equal to 1 if the *SVImedian* is in the top quartile, and 0 otherwise. |
| *LEV* | = | long-term debt/lagged total assets. |
| *ROA* | = | operating income/lagged total assets. |
| *FI* | = | foreign pre-tax income/lagged total assets; Missing values of foreign pre-tax income are set to zero. |
| *R&D* | = | R&D expenditure/lagged total assets; Missing values of R&D expense are set to zero. |
| *INTAN* | = | intangible assets/lagged total assets. |
| *PPE* | = | property, plant and equipment/lagged total assets. |
| *NOL* | = | Indicator variable that equals 1 if tax loss carry forward is positive at the beginning of year t, and 0 otherwise. |
| *DNOL* | = | change in loss carry forward for firm i in year t/lagged total assets. |
| *EQIN* | = | equity income in earnings/lagged total assets; Missing values of equity income are set to zero. |
| *SIZE* | = | logarithm of market value of equity. |
| *MTB* | = | market-to-book ratio measured as market value of equity divided by book value of equity. |
| *AGE* | = | Age of CEO. |
| *Gender* | = | Gender of CEO, equal to 1 if male and 0 otherwise. |
| *Succession* | = | Indicator equal to 1 if the CEO is an outsider and 0 otherwise. |
| *CEONews* | = | Natural log of the number of CEO news items that searching from Google in each year. |
| *CEOTenure* | = | The length of tenure CEO in the position. |

**Table 1: Descriptive statistics**

| Variable | N | Mean | Q1 | Median | Q3 | Std. Dev. |
|---|---|---|---|---|---|---|
| *ETR1* | 2,841 | 0.3080 | 0.2600 | 0.3205 | 0.3668 | 0.0956 |
| *ETR2* | 2,841 | 0.2535 | 0.1505 | 0.2508 | 0.3336 | 0.1497 |
| *BTD1* | 2,841 | 0.0365 | 0.0083 | 0.0268 | 0.0539 | 0.0538 |
| *BTD2* | 2,841 | 0.0279 | 0.0044 | 0.0166 | 0.0399 | 0.0444 |
| *BTD3* | 2,841 | 0.0112 | -0.0051 | 0.0041 | 0.0216 | 0.0368 |
| *SVIMean* | 2,841 | 0.4158 | 0.2408 | 0.4238 | 0.5915 | 0.2281 |
| *SVIMedian* | 2,841 | 0.4072 | 0.2300 | 0.4150 | 0.5900 | 0.2352 |
| *FirmSVIMean* | 2,841 | 0.5677 | 0.4358 | 0.5942 | 0.7250 | 0.2011 |
| *FirmSVIMedian* | 2,841 | 0.5609 | 0.4250 | 0.5850 | 0.7200 | 0.2047 |
| *CEONews* | 2,841 | 1.6234 | 0.0000 | 1.3863 | 2.3979 | 1.5543 |
| *CEOTenure* | 2,841 | 7.0619 | 2.9800 | 5.4000 | 9.0027 | 6.3051 |
| *LEV* | 2,841 | 0.1995 | 0.0821 | 0.1748 | 0.2859 | 0.1682 |
| *ROA* | 2,841 | 0.1300 | 0.0591 | 0.1100 | 0.1798 | 0.1062 |
| *FI* | 2,841 | 0.0419 | 0.0000 | 0.0171 | 0.0665 | 0.0590 |
| *R&D* | 2,841 | 0.0247 | 0.0000 | 0.0000 | 0.0289 | 0.0451 |
| *INTAN* | 2,841 | 0.2370 | 0.0408 | 0.1681 | 0.3632 | 0.2758 |
| *PPE* | 2,841 | 0.2918 | 0.0914 | 0.1930 | 0.4369 | 0.2843 |
| *NOL* | 2,841 | 0.3988 | 0.0000 | 0.0000 | 1.0000 | 0.4897 |
| *DNOL* | 2,841 | 0.0045 | 0.0000 | 0.0000 | 0.0000 | 0.1002 |
| *EQIN* | 2,841 | 0.0017 | 0.0000 | 0.0000 | 0.0004 | 0.0065 |
| *SIZE* | 2,841 | 9.4444 | 8.4112 | 9.3298 | 10.3164 | 1.3837 |
| *MTB* | 2,841 | 3.4955 | 1.7948 | 2.7656 | 4.2836 | 29.1371 |
| *Age* | 2,841 | 55.9247 | 52.0000 | 56.0000 | 60.0000 | 6.4856 |
| *Gender* | 2,841 | 0.9747 | 1.0000 | 1.0000 | 1.0000 | 0.1572 |
| *Succession* | 2,841 | 0.0630 | 0.0000 | 0.0000 | 0.0000 | 0.2430 |
| *log(Taxfees)* | 2,508 | 6.0526 | 4.9359 | 6.2624 | 7.2481 | 1.7258 |
| *Low_Indep* | 2,239 | 0.1550 | 0.0000 | 0.0000 | 0.0000 | 0.3620 |

This table reports the descriptive statistics of the variables used in the paper. The number of observations for the full sample is 2,841.

**Table 2**

**Regressing *SVI* Measures on traditional *CEO* Reputation Measures**

| *Dep. Variable* | ***SVIMean*** | ***SVIMedian*** |
|---|---|---|
| Intercept | – 32.562*** | – 33.498*** |
| | (– 6.95) | (– 6.90) |
| *CEONews* | 0.012*** | 0.012*** |
| | (4.51) | (4.37) |
| *CEOTenure* | – 0.005*** | – 0.005*** |
| | (– 6.22) | (– 5.72) |
| *Age* | 0.002*** | 0.002*** |
| | (3.15) | (3.02) |
| *Gender* | 0.082*** | 0.080*** |
| | (3.04) | (2.86) |
| *Succession* | – 0.024 | – 0.029 |
| | (– 1.35) | (– 1.59) |
| Industry Fixed Effects | Yes | Yes |
| Year Fixed Effects | Yes | Yes |
| Obs. | 2841 | 2841 |
| Adj. $R^2$ | 10.66% | 10.03% |

*, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively, under two-tailed tests.

t-statistics, in parentheses, are based on standard errors adjusted for firm-level clustering.

This table summarizes the results of regressing *SVIMean* and *SVIMedian* on other measures related with CEO reputation, i.e. *CEONews, CEOTenure, Age, Gender & Succession*.

*Age* = Age of *CEO*;

*Gender* = Gender of *CEO*, equal to 1 if male and 0 otherwise;

*Succession* = Indicator equal to 1 if the *CEO* is an outsider and 0 otherwise.

The other variables are defined as in Appendix I.

**Table 3**

**CEO SVI and Tax avoidance activities: Results on the Effective Tax Rate**

***Panel A: SVI Mean***

| *Dep. Variable* | ***ETR1*** | | ***ETR2*** | |
|---|---|---|---|---|
| Intercept | 0.3326*** | 0.3310*** | 0.2787*** | 0.2778*** |
| | (9.27) | (9.24) | (4.69) | (4.67) |
| *SVIMean* | -0.0363*** | -0.0347*** | -0.0472*** | -0.0464*** |
| | (-4.82) | (-4.64) | (-3.85) | (-3.76) |
| *CEONews* | | -0.0025** | | -0.0013 |
| | | (-2.23) | | (-0.75) |
| *LEV* | 0.0381** | 0.0375** | -0.0079 | -0.0082 |
| | (2.30) | (2.26) | (-0.36) | (-0.37) |
| *ROA* | 0.1540*** | 0.1536*** | 0.0319 | 0.0317 |
| | (6.33) | (6.34) | (0.88) | (0.87) |
| *FI* | -0.4349*** | -0.4322*** | -0.1744** | -0.1730** |
| | (-9.08) | (-9.09) | (-2.25) | (-2.23) |
| *R&D* | -0.2677*** | -0.2506*** | -0.5761*** | -0.5670*** |
| | (-4.29) | (-3.98) | (-7.32) | (-7.09) |
| *INTAN* | 0.0190* | 0.0195** | 0.0668*** | 0.0671*** |
| | (1.90) | (1.96) | (3.55) | (3.57) |
| *PPE* | -0.0139 | -0.0133 | -0.1010*** | -0.1006*** |
| | (-0.71) | (-0.69) | (-2.86) | (-2.86) |
| *NOL* | -0.0037 | -0.0039 | -0.0047 | -0.0048 |
| | (-1.07) | (-1.14) | (-0.79) | (-0.82) |
| *DNOL* | -0.0297 | -0.0301 | -0.0210 | -0.0212 |
| | (-1.31) | (-1.34) | (-0.89) | (-0.90) |
| *EQIN* | 0.1528 | 0.1869 | -0.5087 | -0.4906 |
| | (0.39) | (0.48) | (-1.27) | (-1.22) |
| *SIZE* | -0.0050*** | -0.0042** | 0.0022 | 0.0026 |
| | (-2.93) | (-2.35) | (0.83) | (0.96) |
| *MTB* | 0.0001* | 0.0001* | 0.0001 | 0.0001 |
| | (1.79) | (1.74) | (1.23) | (1.22) |
| *Age* | 0.0004 | 0.0004 | 0.0005 | 0.0005 |
| | (1.61) | (1.64) | (1.32) | (1.33) |
| *Gender* | 0.0077 | 0.0071 | 0.0196 | 0.0193 |
| | (0.94) | (0.87) | (1.25) | (1.23) |
| *Succession* | -0.0085 | -0.0083 | -0.0082 | -0.0080 |
| | (-1.19) | (-1.16) | (-0.63) | (-0.62) |
| Industry Fixed Effects | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes |
| Obs. | 2841 | 2841 | 2841 | 2841 |
| Adj. $R^2$ | 28.62% | 28.74% | 16.47% | 16.45% |

***Panel B: SVI Median***

| *Dep. Variable* | ***ETR1*** | | ***ETR2*** | |
|---|---|---|---|---|
| Intercept | 0.3326*** | 0.3310*** | 0.2786*** | 0.2777*** |
| | (9.92) | (9.23) | (4.69) | (4.66) |
| *SVIMedian* | -0.0341*** | -0.0327*** | -0.0448*** | -0.0440*** |
| | (-4.72) | (-4.53) | (-3.77) | (-3.69) |
| *CEONews* | | -0.0026** | | -0.0014 |
| | | (-2.26) | | (-0.77) |
| *LEV* | 0.0379** | 0.0373** | -0.0081 | -0.0085 |
| | (2.28) | (2.25) | (-0.37) | (-0.38) |
| *ROA* | 0.1540*** | 0.1535*** | 0.0318 | 0.0316 |
| | (6.33) | (6.34) | (0.88) | (0.87) |
| *FI* | -0.4354*** | -0.4327*** | -0.1750** | -0.1735** |
| | (-9.08) | (-9.09) | (-2.25) | (-2.23) |
| *R&D* | -0.2668*** | -0.2495*** | -0.5752*** | -0.5659*** |
| | (-4.27) | (-3.96) | (-7.31) | (-7.07) |
| *INTAN* | 0.0190* | 0.0195** | 0.0668*** | 0.0671*** |
| | (1.90) | (1.96) | (3.55) | (3.57) |
| *PPE* | -0.0139 | -0.0132 | -0.1009*** | -0.1006*** |
| | (-0.71) | (-0.68) | (-2.86) | (-2.86) |
| *NOL* | -0.0037 | -0.0039 | -0.0047 | -0.0048 |
| | (-1.08) | (-1.15) | (-0.80) | (-0.82) |
| *DNOL* | -0.0296 | -0.0300 | -0.0209 | -0.0211 |
| | (-1.31) | (-1.34) | (-0.89) | (-0.90) |
| *EQIN* | 0.1526 | 0.1871 | -0.5088 | -0.4901 |
| | (0.39) | (0.48) | (-1.27) | (-1.22) |
| *SIZE* | -0.0050*** | -0.0042** | 0.0022 | 0.0026 |
| | (-2.95) | (-2.36) | (0.81) | (0.95) |
| *MTB* | 0.0001* | 0.0001* | 0.0001 | 0.0001 |
| | (1.80) | (1.75) | (1.23) | (1.23) |
| *Age* | 0.0004 | 0.0004* | 0.0005 | 0.0006 |
| | (1.62) | (1.65) | (1.32) | (1.33) |
| *Gender* | 0.0075 | 0.0069 | 0.0194 | 0.0190 |
| | (0.91) | (0.85) | (1.23) | (1.21) |
| *Succession* | -0.0085 | -0.0083 | -0.0083 | -0.0081 |
| | (-1.20) | (-1.17) | (-0.63) | (-0.62) |
| Industry Fixed Effects | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes |
| Obs. | 2841 | 2841 | 2841 | 2841 |
| Adj. $R^2$ | 28.59% | 28.71% | 16.45% | 16.43% |

*, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively, under two-tailed tests.

t-statistics, in parentheses, are based on robust standard errors.

This table summarizes the results of Equation (1), the regression of CEO SVI on tax aggressiveness measure, i.e. effective tax rates (*ETR1* & *ETR2*). The second column also includes *CEONews*.

The variables are defined as in Appendix I.

**Table 4**
**CEO SVI and Tax avoidance activities: Effects of Board Independence**

| *Dep. Variable* | ***ETR1*** | | ***ETR2*** | |
|---|---|---|---|---|
| Intercept | 0.3326*** | 0.3330*** | 0.3153*** | 0.3157*** |
| | (8.84) | (8.82) | (4.57) | (4.57) |
| *SVIMean* | -0.0302*** | | -0.0587*** | |
| | (-3.36) | | (-3.81) | |
| *SVIMedian* | | -0.0283*** | | -0.0589*** |
| | | (-3.25) | | (-3.95) |
| *Low_Indep* | 0.0337*** | 0.0289*** | -0.0028 | -0.0085 |
| | (3.54) | (3.33) | (-0.14) | (-0.46) |
| *SVIMean*Low_Indep* | -0.0689*** | | 0.0142 | |
| | (-3.42) | | (0.36) | |
| *SVIMedian*Low_Indep* | | -0.0588*** | | 0.0284 |
| | | (-3.15) | | (0.75) |
| *CEONews* | -0.0019 | -0.0020 | 0.0007 | 0.0007 |
| | (-1.50) | (-1.54) | (0.34) | (0.31) |
| *CEOTenure* | 0.0004 | 0.0005 | -0.0005 | -0.0005 |
| | (1.43) | (1.50) | (-0.78) | (-0.76) |
| *LEV* | 0.0443*** | 0.0446*** | 0.0364 | 0.0374 |
| | (3.27) | (3.29) | (1.46) | (1.50) |
| *ROA* | 0.1811*** | 0.1809*** | 0.0460 | 0.0455 |
| | (6.13) | (6.11) | (0.93) | (0.92) |
| *FI* | -0.3650*** | -0.3651*** | -0.1122 | -0.1126 |
| | (-7.06) | (-7.02) | (-1.18) | (-1.18) |
| *R&D* | -0.2887*** | -0.2846*** | -0.3700*** | -0.3654*** |
| | (-3.56) | (-3.51) | (-3.36) | (-3.32) |
| *INTAN* | 0.0148* | 0.0146* | 0.0494** | 0.0491** |
| | (1.82) | (1.79) | (2.58) | (2.56) |
| *PPE* | -0.0229 | -0.0226 | -0.1154*** | -0.1152*** |
| | (-1.24) | (-1.21) | (-3.01) | (-2.99) |
| *NOL* | -0.0047 | -0.0046 | -0.0064 | -0.0064 |
| | (-1.32) | (-1.29) | (-0.96) | (-0.96) |
| *DNOL* | -0.0114 | -0.0114 | 0.0199 | 0.0190 |
| | (-0.19) | (-0.19) | (0.30) | (0.28) |
| *EQIN* | 0.1888 | 0.1873 | -0.2474 | -0.2533 |
| | (0.44) | (0.43) | (-0.52) | (-0.53) |
| *SIZE* | -0.0039** | -0.0039* | -0.0012 | -0.0012 |
| | (-1.96) | (-1.94) | (-0.38) | (-0.38) |
| *MTB* | 0.0001* | 0.0001* | 0.0001* | 0.0001* |
| | (1.89) | (1.90) | (1.65) | (1.67) |
| *Age* | 0.0002 | 0.0001 | 0.0004 | 0.0004 |
| | (0.50) | (0.46) | (0.66) | (0.66) |
| *Gender* | 0.0049 | 0.0047 | 0.0180 | 0.0180 |
| | (0.60) | (0.57) | (1.06) | (1.07) |
| *Succession* | -0.0087 | -0.0086 | -0.0003 | -0.0003 |
| | (-1.19) | (-1.17) | (-0.02) | (-0.02) |
| Industry Fixed Effects | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes |
| Obs. | 2239 | 2239 | 2239 | 2239 |
| Adj. $R^2$ | 28.98% | 28.83% | 12.97% | 12.99% |

*, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively, under two-tailed tests.
t-statistics, in parentheses, are based on robust standard errors.

This table summarizes the results of the regression of tax aggressiveness measures (i.e. effective tax rates (*ETR1*) on SVI measures with the interaction of the indicator for board independence (*Low_Indep*).
*Low_Indep* is an indicator equal to 1 if the board contains less than 67% independent directors, and 0 otherwise. The other variables are defined as in Appendix I.

**Table 5**
**CEO SVI and Tax Fees**

| *Dep. Variable = log(Taxfees)* | | |
|---|---|---|
| Intercept | 181.479*** | 181.967*** |
| | (6.07) | (6.12) |
| *SVIMean* | 0.273** | |
| | (2.08) | |
| *SVIMedian* | | 0.308** |
| | | (2.44) |
| *CEONews* | 0.003 | 0.003 |
| | (0.14) | (0.13) |
| *CEOTenure* | – 0.028*** | – 0.028*** |
| | (– 4.95) | (– 4.95) |
| *Age* | 0.014*** | 0.014*** |
| | (2.68) | (2.67) |
| *SIZE* | 0.615*** | 0.614*** |
| | (22.61) | (22.20) |
| *LEV* | – 0.274 | – 0.282 |
| | (– 1.40) | (– 1.44) |
| *ROA* | – 0.426 | – 0.420 |
| | (– 0.88) | (– 0.86) |
| *FI* | 2.744*** | 2.748*** |
| | (3.74) | (3.75) |
| *MTB* | – 0.001 | – 0.001 |
| | (0.40) | (0.40) |
| *BIG4* | 0.060 | 0.061 |
| | (0.87) | (0.89) |
| Industry Fixed Effects | Yes | Yes |
| Year Fixed Effects | Yes | Yes |
| Obs. | 2538 | 2538 |
| Adj. $R^2$ | 38.28% | 38.32% |

*, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively, under two-tailed tests.

t-statistics, in parentheses, are based on robust standard errors.

This table summarizes the results of regressing tax fees on CEO SVI measures.

*log(Taxfees)* is the natural log of the tax fees (in thousands) paid by the firm.

*BIG4* is an indicator equal to 1 if the firm is audited by a Big 4 auditor, and 0 otherwise.

The other variables are defined as in Appendix I.

**Table 6**
**CEO SVI and Tax avoidance activities: Results on the Book-Tax Difference**

***Panel A: SVI Mean***

| *Dep. Variable* | ***BTD1*** | | ***BTD2*** | | ***BTD3*** | |
|---|---|---|---|---|---|---|
| Intercept | -0.0285 | -0.0275 | -0.0009 | 0.0005 | -0.0045 | -0.0033 |
| | (-1.10) | (-1.06) | (-0.04) | (0.03) | (-0.15) | (-0.11) |
| *SVIMean* | 0.0165*** | 0.0156*** | 0.0155*** | 0.0142*** | 0.0113* | 0.0102 |
| | (4.08) | (3.91) | (5.19) | (4.90) | (1.81) | (1.63) |
| *CEONews* | | 0.0016** | | 0.0021*** | | 0.0018** |
| | | (2.49) | | (4.22) | | (2.07) |
| Control | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Obs. | 2841 | 2841 | 2841 | 2841 | 2841 | 2841 |
| Adj. $R^2$ | 29.44% | 29.58% | 43.51% | 43.94% | 34.71% | 34.76% |

***Panel B: SVI Median***

| *Dep. Variable* | ***BTD1*** | | ***BTD2*** | | ***BTD3*** | |
|---|---|---|---|---|---|---|
| Intercept | -0.0285 | -0.0274 | -0.0009 | 0.0005 | -0.0044 | -0.0033 |
| | (-1.10) | (-1.05) | (-0.04) | (0.03) | (-0.15) | (-0.11) |
| *SVIMedian* | 0.0163*** | 0.0154*** | 0.0146*** | 0.0134*** | 0.0112* | 0.0102* |
| | (4.13) | (3.97) | (5.03) | (4.74) | (1.88) | (1.71) |
| *CEONews* | | 0.0016** | | 0.0022*** | | 0.0018** |
| | | (2.50) | | (4.24) | | (2.08) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Obs. | 2841 | 2841 | 2841 | 2841 | 2841 | 2841 |
| Adj. $R^2$ | 29.45% | 29.59% | 43.48% | 43.92% | 34.71% | 34.77% |

*, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively, under two-tailed tests.

t-statistics, in parentheses, are based on standard errors adjusted for firm-level clustering.

This table summarizes the results of Equation (1), the regression of CEO SVI on tax aggressiveness measure, i.e. book-tax difference (*BTD1*, *BTD2* & *ETR2*). The second column also includes *CEONews*.

The variables are defined as in Appendix I.

**Table 7**
**CEO SVI and Tax avoidance activities: Controlling Firm SVI**

| *Dep. Variable* | ***ETR1*** | | ***ETR2*** | |
|---|---|---|---|---|
| Intercept | 0.3339*** | 0.3342*** | 0.2821*** | 0.2833*** |
| | (9.27) | (9.29) | (4.71) | (4.74) |
| *SVIMean* | -0.0290*** | | -0.0379** | |
| | (-2.86) | | (-2.27) | |
| *SVIMedian* | | -0.0264*** | | -0.0334** |
| | | (-2.74) | | (-2.07) |
| *FirmSVIMean* | -0.0099 | | -0.0147 | |
| | (-0.87) | | (-0.78) | |
| *FirmSVIMedian* | | -0.0112 | | -0.0190 |
| | | (-1.02) | | (-1.02) |
| *CEONews* | -0.0026** | -0.0026** | -0.0014 | -0.0015 |
| | (-2.27) | (-2.30) | (-0.78) | (-0.81) |
| *LEV* | 0.0371** | 0.0369** | -0.0089 | -0.0092 |
| | (2.24) | (2.22) | (-0.40) | (-0.41) |
| *ROA* | 0.1544*** | 0.1546*** | 0.0329 | 0.0333 |
| | (6.40) | (6.41) | (0.91) | (0.92) |
| *FI* | -0.4342*** | -0.4348*** | -0.1758** | -0.1772** |
| | (-9.11) | (-9.12) | (-2.25) | (-2.27) |
| *R&D* | -0.2481*** | -0.2467*** | -0.5633*** | -0.5610*** |
| | (-3.93) | (-3.91) | (-7.03) | (-7.00) |
| *INTAN* | 0.0196** | 0.0196** | 0.0671*** | 0.0672*** |
| | (1.97) | (1.97) | (3.58) | (3.58) |
| *PPE* | -0.0134 | -0.0134 | -0.1008*** | -0.1009*** |
| | (-0.69) | (-0.69) | (-2.85) | (-2.85) |
| *NOL* | -0.0041 | -0.0042 | -0.0051 | -0.0052 |
| | (-1.20) | (-1.22) | (-0.87) | (-0.89) |
| *DNOL* | -0.0300 | -0.0299 | -0.0212 | -0.0210 |
| | (-1.35) | (-1.35) | (-0.91) | (-0.92) |
| *EQIN* | 0.1889 | 0.1899 | -0.4876 | -0.4854 |
| | (0.48) | (0.48) | (-1.21) | (-1.20) |
| *SIZE* | -0.0043** | -0.0043** | 0.0025 | 0.0025 |
| | (-2.38) | (-2.39) | (0.93) | (0.93) |
| *MTB* | 0.0001* | 0.0001* | 0.0001 | 0.0001 |
| | (1.70) | (1.71) | (1.22) | (1.22) |
| *Age* | 0.0004 | 0.0004 | 0.0005 | 0.0005 |
| | (1.63) | (1.63) | (1.32) | (1.32) |
| *Gender* | 0.0071 | 0.0069 | 0.0192 | 0.0190 |
| | (0.87) | (0.85) | (1.23) | (1.21) |
| *Succession* | -0.0083 | -0.0084 | -0.0081 | -0.0082 |
| | (-1.17) | (-1.17) | (-0.62) | (-0.63) |
| Industry Fixed Effects | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes |
| Obs. | 2239 | 2239 | 2239 | 2239 |
| Adj. $R^2$ | 28.73% | 28.71% | 16.44% | 16.44% |

*, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively, under two-tailed tests.
t-statistics, in parentheses, are based on robust standard errors.

This table summarizes the results of the regression of tax aggressiveness measures (i.e. effective tax rates (*ETR1*) on SVI measures with interaction of indicator for board independence (*Low_Indep*).
*Low_Indep* is an indicator equal to 1 if the board contains less than 67% independent directors, and 0 otherwise. The other variables are defined as in Appendix I.

**Table 8**
**CEO SVI and Tax avoidance activities: Results on Dynamic Panel System GMM**

***Panel A: SVI Mean***

| *Dep. Variable* | **ETR1** | **ETR2** | **BTD1** | **BTD2** | **BTD3** |
|---|---|---|---|---|---|
| *SVIMean* | -0.0763** | -0.0474 | 0.0421** | 0.0341*** | 0.0339*** |
| | (-2.48) | (-1.13) | (2.42) | (3.04) | (3.06) |
| *CEONews* | -0.0052 | 0.0065 | 0.0037* | 0.0041*** | 0.0032** |
| | (-1.61) | (1.03) | (1.90) | (2.71) | (2.16) |
| *LEV* | -0.0435 | 0.0064 | -0.0035 | 0.0041 | 0.0020 |
| | (-1.60) | (0.14) | (-0.20) | (0.34) | (0.18) |
| *ROA* | 0.1149** | -0.1677* | 0.1219*** | 0.1255*** | 0.0336 |
| | (1.98) | (-1.65) | (2.75) | (4.31) | (1.14) |
| *FI* | -0.4835*** | 0.0043 | 0.1040 | 0.1547*** | 0.1995*** |
| | (-4.68) | (0.02) | (1.03) | (2.86) | (3.42) |
| *R&D* | -0.4067** | -0.5252** | 0.0277 | 0.0919 | 0.1216* |
| | (-2.54) | (-2.33) | (0.31) | (1.46) | (1.84) |
| *INTAN* | 0.0149 | 0.0726*** | -0.0069 | 0.0024 | -0.0006 |
| | (0.80) | (2.78) | (-0.80) | (0.38) | (-0.10) |
| *PPE* | 0.0714*** | -0.0538 | -0.0177 | -0.0429*** | -0.0373*** |
| | (3.58) | (-1.40) | (-0.86) | (-3.67) | (-2.96) |
| *NOL* | -0.0018 | 0.0206 | 0.0014 | -0.0011 | 0.0035 |
| | (-0.17) | (1.20) | (0.23) | (-0.27) | (0.92) |
| *DNOL* | -0.0233 | 0.0434 | -0.0209 | -0.0257 | -0.0254 |
| | (-0.33) | (0.42) | (-0.43) | (-0.58) | (-0.54) |
| *EQIN* | 1.8060** | -0.9665 | -1.1483* | -1.0936*** | -1.6406*** |
| | (2.13) | (-0.53) | (-1.92) | (-2.80) | (-3.98) |
| *SIZE* | -0.0067 | -0.0123 | -0.0012 | -0.0007 | 0.0011 |
| | (-0.99) | (-1.20) | (-0.30) | (-0.28) | (0.43) |
| *MTB* | 0.0000 | 0.0001* | -0.0000 | -0.0000 | -0.0000 |
| | (0.48) | (1.80) | (-0.60) | (-0.44) | (-0.90) |
| *Age* | 0.0006 | -0.0006 | 0.0006 | -0.0001 | 0.0002 |
| | (0.82) | (-0.50) | (1.06) | (-0.26) | (0.47) |
| *Gender* | 0.0024 | 0.0185 | 0.0085 | 0.0074 | 0.0089 |
| | (0.11) | (0.69) | (1.06) | (1.08) | (1.40) |
| *Succession* | 0.0859** | 0.0971 | -0.0235 | -0.0061 | -0.0213 |
| | (2.16) | (1.62) | (-0.87) | (-0.42) | (-1.32) |
| *ETR1 (lag 1)* | -0.0544 | | | | |
| | (-0.79) | | | | |
| *ETR1 (lag 2)* | 0.0227 | | | | |
| | (0.59) | | | | |
| *ETR2 (lag 1)* | | 0.1925*** | | | |
| | | (3.74) | | | |
| *ETR2 (lag 2)* | | 0.0445 | | | |
| | | (0.84) | | | |
| *BTD1 (lag 1)* | | | 0.1536*** | | |
| | | | (3.55) | | |
| *BTD1 (lag 2)* | | | -0.0196 | | |
| | | | (-0.66) | | |
| *BTD2 (lag 1)* | | | | 0.1572*** | |
| | | | | (3.08) | |
| *BTD2 (lag 2)* | | | | 0.0779** | |
| | | | | (2.44) | |
| *BTD3 (lag 1)* | | | | | -0.1362*** |
| | | | | | (-2.65) |
| *BTD3 (lag 2)* | | | | | 0.0972** |
| | | | | | (2.25) |
| AR(1) test (p value) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| AR(2) test (p value) | 0.408 | 0.802 | 0.481 | 0.556 | 0.147 |
| Hansen test (p value) | 0.458 | 0.252 | 0.229 | 0.231 | 0.381 |
| Obs. | 1716 | 1716 | 1716 | 1716 | 1716 |

| ***Panel B: SVI Median*** | | | | | |
|---|---|---|---|---|---|
| *Dep. Variable* | **ETR1** | **ETR2** | **BTD1** | **BTD2** | **BTD3** |
| *SVIMedian* | -0.0714** | -0.0484 | 0.0422** | 0.0337*** | 0.0338*** |
| | (-2.45) | (-1.18) | (2.44) | (3.09) | (3.05) |
| *CEONews* | -0.0050 | 0.0063 | 0.0038* | 0.0042*** | 0.0032** |
| | (-1.54) | (0.98) | (1.93) | (2.82) | (2.20) |
| *LEV* | -0.0411 | 0.0118 | -0.0051 | 0.0039 | 0.0022 |
| | (-1.51) | (0.27) | (-0.30) | (0.32) | (0.19) |
| *ROA* | 0.1186** | -0.1645 | 0.1203*** | 0.1252*** | 0.0330 |
| | (2.06) | (-1.62) | (2.76) | (4.31) | (1.12) |
| *FI* | -0.4930*** | 0.0046 | 0.1082 | 0.1532*** | 0.1978*** |
| | (-4.74) | (0.02) | (1.08) | (2.85) | (3.44) |
| *R&D* | -0.3891** | -0.5165** | 0.0171 | 0.0887 | 0.1214* |
| | (-2.39) | (-2.28) | (0.19) | (1.39) | (1.83) |
| *INTAN* | 0.0162 | 0.0740*** | -0.0075 | 0.0020 | -0.0012 |
| | (0.89) | (2.81) | (-0.87) | (0.31) | (-0.18) |
| *PPE* | 0.0698*** | -0.0546 | -0.0182 | -0.0423*** | -0.0367*** |
| | (3.37) | (-1.43) | (-0.87) | (-3.59) | (-2.83) |
| *NOL* | -0.0014 | 0.0202 | 0.0016 | -0.0013 | 0.0035 |
| | (-0.13) | (1.19) | (0.26) | (-0.31) | (0.90) |
| *DNOL* | -0.0217 | 0.0460 | -0.0209 | -0.0263 | -0.0244 |
| | (-0.30) | (0.44) | (-0.44) | (-0.60) | (-0.53) |
| *EQIN* | 1.8669** | -0.8095 | -1.2728** | -1.1424*** | -1.6680*** |
| | (2.24) | (-0.47) | (-2.08) | (-3.00) | (-4.17) |
| *SIZE* | -0.0055 | -0.0113 | -0.0020 | -0.0010 | 0.0008 |
| | (-0.78) | (-1.11) | (-0.48) | (-0.39) | (0.30) |
| *MTB* | 0.0000 | 0.0001* | -0.0000 | -0.0000 | -0.0000 |
| | (0.47) | (1.81) | (-0.60) | (-0.45) | (-0.92) |
| *Age* | 0.0008 | -0.0006 | 0.0005 | -0.0001 | 0.0001 |
| | (1.04) | (-0.53) | (0.89) | (-0.37) | (0.37) |
| *Gender* | 0.0029 | 0.0182 | 0.0077 | 0.0071 | 0.0086 |
| | (0.13) | (0.67) | (0.96) | (1.04) | (1.34) |
| *Succession* | 0.0798* | 0.1024* | -0.0219 | -0.0050 | -0.0198 |
| | (1.93) | (1.67) | (-0.78) | (-0.34) | (-1.18) |
| *ETR1 (lag 1)* | -0.0489 | | | | |
| | (-0.72) | | | | |
| *ETR1 (lag 2)* | 0.0298 | | | | |
| | (0.78) | | | | |
| *ETR2 (lag 1)* | | 0.1940*** | | | |
| | | (3.76) | | | |
| *ETR2 (lag 2)* | | 0.0386 | | | |
| | | (0.74) | | | |
| *BTD1 (lag 1)* | | | 0.1517*** | | |
| | | | (3.49) | | |
| *BTD1 (lag 2)* | | | -0.0220 | | |
| | | | (-0.73) | | |
| *BTD2 (lag 1)* | | | | 0.1556*** | |
| | | | | (3.04) | |
| *BTD2 (lag 2)* | | | | 0.0781** | |
| | | | | (2.46) | |
| *BTD3 (lag 1)* | | | | | -0.1366*** |
| | | | | | (-2.69) |
| *BTD3 (lag 2)* | | | | | 0.0981** |
| | | | | | (2.27) |
| AR(1) test (p value) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| AR(2) test (p value) | 0.406 | 0.744 | 0.478 | 0.511 | 0.131 |
| Hansen test (p value) | 0.570 | 0.278 | 0.196 | 0.242 | 0.373 |
| Obs. | 1716 | 1716 | 1716 | 1716 | 1716 |

*, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively, under two-tailed tests.
z-statistics, in parentheses, are based on robust standard errors.
This table reports two-step dynamic panel system GMM estimations of tax avoidance measures on CEO SVI measures. All models include year dummy variables. All independent variables are treated as endogenous except year dummy variables. Endogenous variables are instrumented by three of their past values. The null hypothesis for the Hansen test of overidentification is that all instruments are exogenous. AR(1) and AR(2) are test statistics for the null hypothesis that there is no serial correlation of orders 1 and 2 in the first-difference residuals.
The variables are defined as in Appendix I.

**Table 9**
**CEO SVI and Tax avoidance activities: Results on Propensity-score Matched Sample**

***Panel A: Propensity Score Model***

| *Dep. Variable* | **Top25%SVIMean** | **Top25%SVIMedian** |
|---|---|---|
| *Intercept* | -1.7760*** | -1.6238*** |
| | (-3.04) | (-2.77) |
| *CEONews* | 0.0435** | 0.0314* |
| | (2.33) | (1.66) |
| *LEV* | 0.8301*** | 0.8240*** |
| | (3.99) | (3.92) |
| *ROA* | -0.1394 | -0.1329 |
| | (-0.37) | (-0.35) |
| *FI* | -0.7586 | -0.9346 |
| | (-1.10) | (-1.33) |
| *R&D* | -4.8212*** | -4.2794*** |
| | (-4.84) | (-4.27) |
| *INTAN* | 0.0525 | 0.0997 |
| | (0.45) | (0.86) |
| *PPE* | -0.1709 | -0.1808 |
| | (-0.91) | (-0.94) |
| *NOL* | -0.0964 | -0.0837 |
| | (-1.54) | (-1.33) |
| *DNOL* | -0.5952 | -0.3910 |
| | (-1.12) | (-0.76) |
| *EQIN* | 0.2664 | -2.8939 |
| | (0.06) | (-0.58) |
| *SIZE* | 0.0423 | 0.0469* |
| | (1.50) | (1.65) |
| *MTB* | 0.0019 | 0.0013 |
| | (1.05) | (0.83) |
| *Age* | 0.0045 | 0.0042 |
| | (1.01) | (0.93) |
| *Gender* | 0.2464 | 0.1806 |
| | (1.38) | (1.01) |
| *Succession* | 0.0009 | -0.0176 |
| | (0.01) | (-0.15) |
| Industry Fixed Effects | Yes | Yes |
| Year Fixed Effects | Yes | Yes |
| Pseudo R2 | 7.01% | 7.26% |
| Obs. | 2729 | 2742 |

***Panel B Differences-in-Mean tests in PSM Sample***

| | Top25%SVIMean | Non-Top25%SVIMean | Differences-in-Mean |
|---|---|---|---|
| ETR1 | 0.2994 | 0.3122 | -0.0128** |
| ETR2 | 0.2433 | 0.273 | -0.0297*** |
| Obs | 709 | 709 | |
| | Top25%SVIMedian | Non-Top25%SVIMedian | Difference-in-Mean |
| ETR1 | 0.2980 | 0.3126 | -0.0145*** |
| ETR2 | 0.2423 | 0.2664 | -0.02411*** |
| Obs | 674 | 674 | |

*, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively, under two-tailed tests.
z-statistics, in parentheses, appear in Panel A.
Panel A reports the probit model regression analysis, which is used to obtain the propensity-score. Panel B reports the differences-in-mean test between the top quartile of the CEO SVI and matched non-top quartile in the propensity-score matched sample. All the variables are reported in Appendix I.